Now Revise

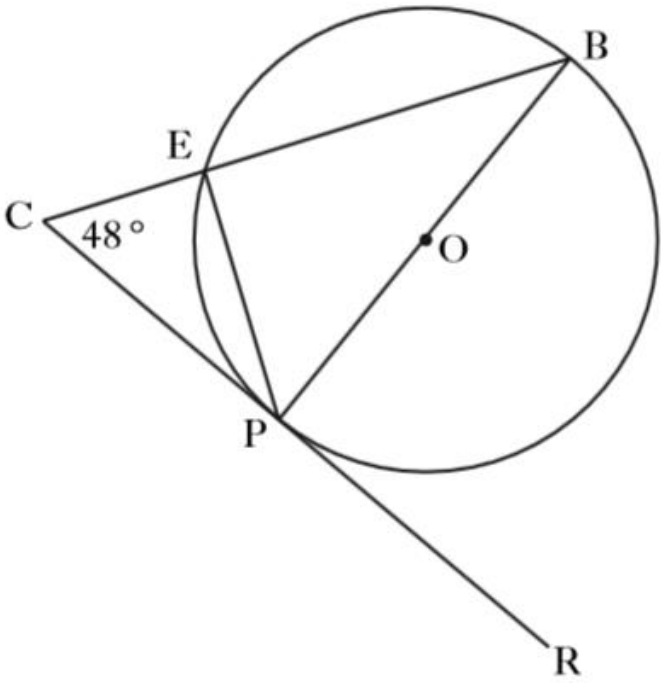
Routine – Non Calculator

Shape

Relationships 1.4

1

A circle, centre O, is shown below.

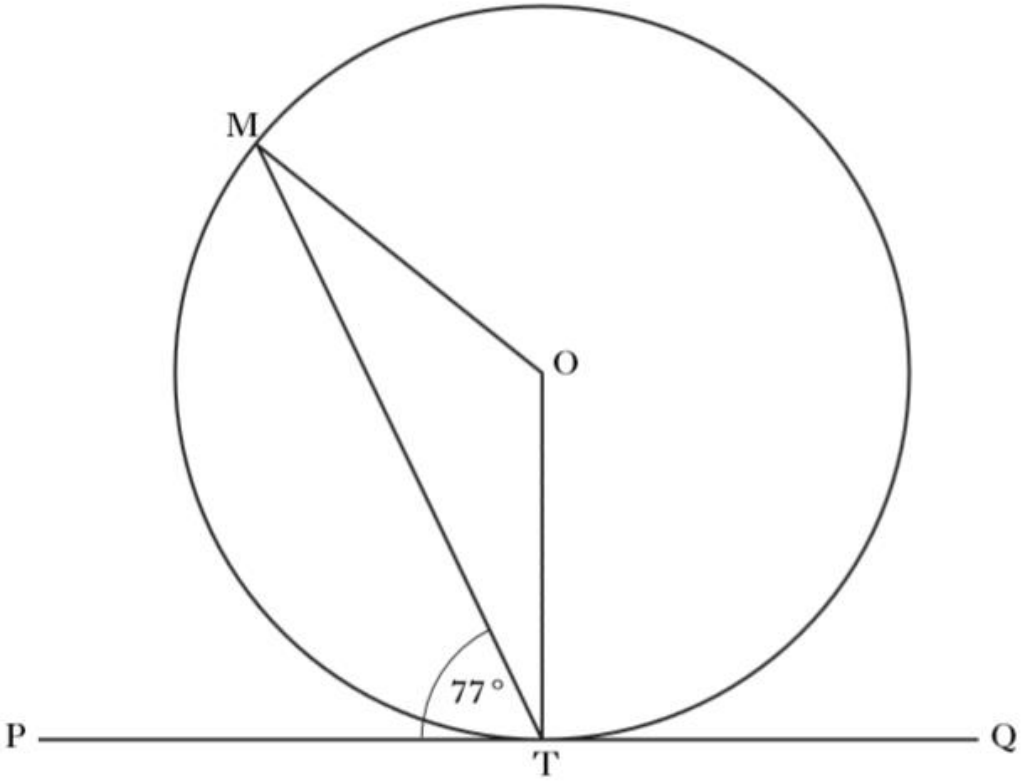


In the circle

- PB is a diameter
- CR is a tangent to the circle at point P
- Angle BCP is 48°.

Calculate the size of angle EPR.

2

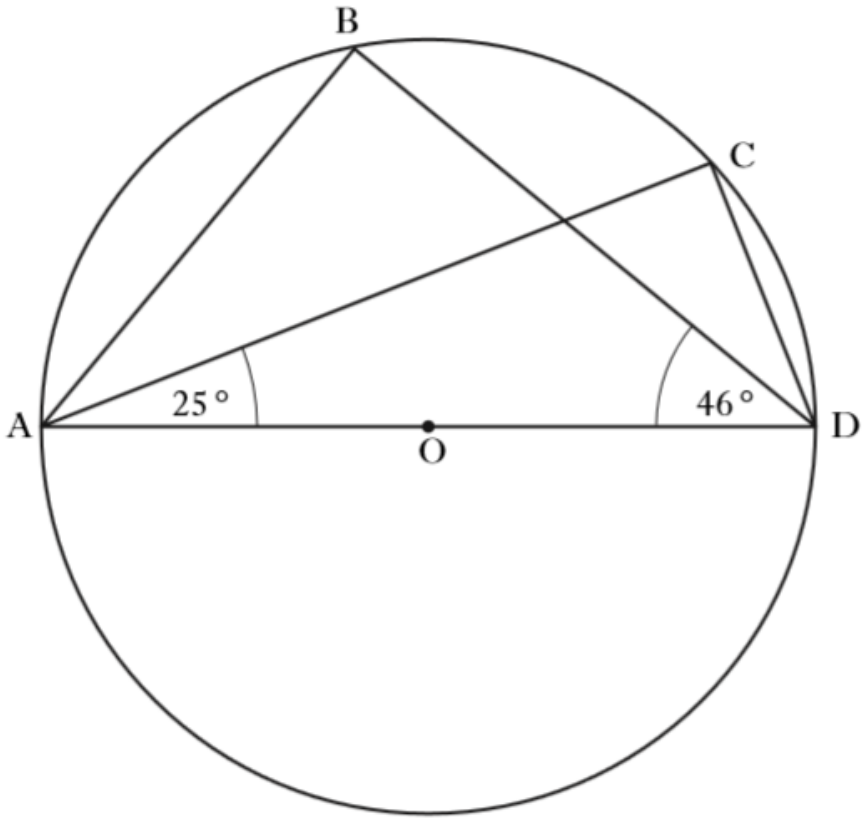


The tangent PQ touches the circle, centre O, at T.
Angle MTP is 77°.

(*a*) Calculate the size of angle MOT.

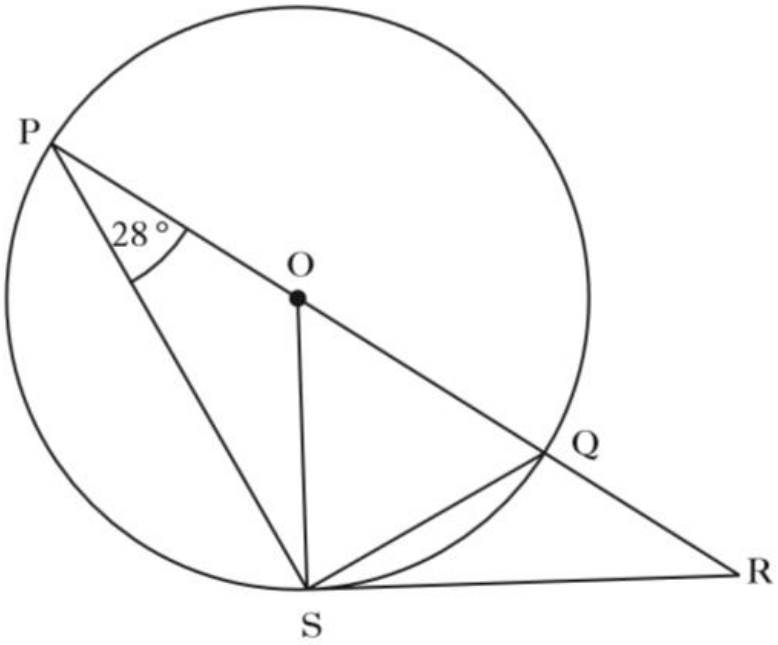
(*b*) The radius of the circle is 8 centimetres.
Calculate the length of chord MT.

3



AD is a diameter of a circle, centre O.
B and C are points on the circumference of the circle.
Angle CAD = 25°.
Angle BDA = 46°.
Calculate the size of angle BAC.

4



In the above diagram,

- O is the centre of the circle
- PQ is a diameter of the circle
- PQR is a straight line
- RS is a tangent to the circle at S
- angle OPS is 28°.

Calculate the size of angle QRS.

Now Revise

Routine – Calculator

Shape

Relationships 1.4

5

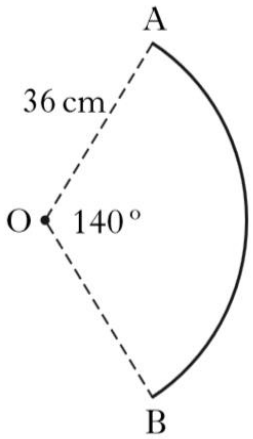
Shampoo is available in travel size and salon size bottles.
The bottles are mathematically similar.

travel salon

The travel size contains 200 millilitres and is 12 centimetres in height.
The salon size contains 1600 millilitres.
Calculate the height of the salon size bottle.

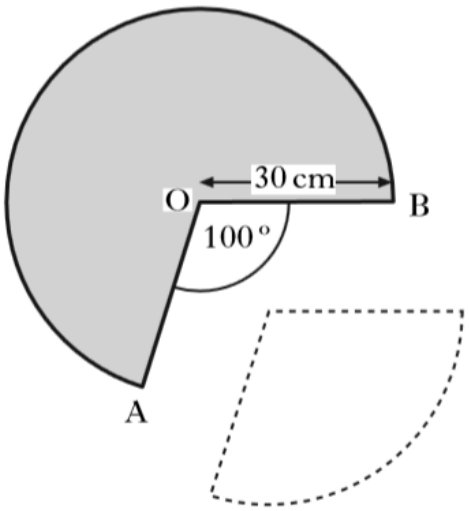
6

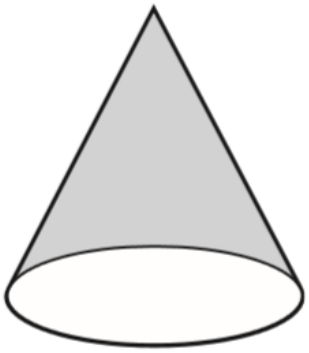
A circle, centre O, has radius 36 centimetres.
Part of this circle is shown.
Angle AOB = 140°.



Calculate the length of arc AB.

7 A cone is formed from a paper circle with a sector removed as shown.
The radius of the paper circle is 30 cm.
Angle AOB is 100°.

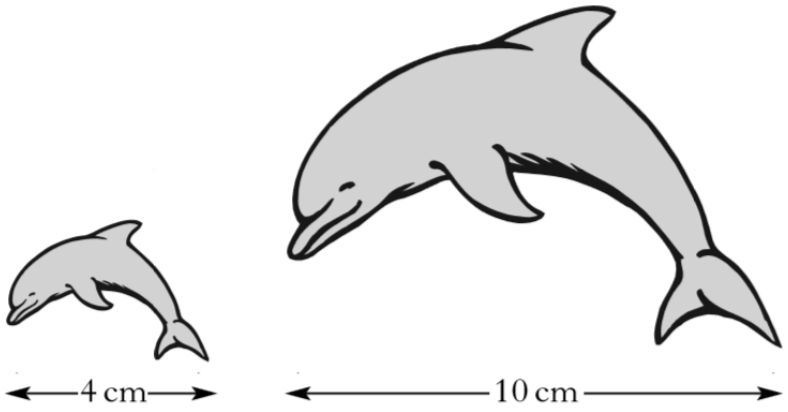




(*a*) Calculate the area of paper used to make the cone.

(*b*) Calculate the circumference of the base of the cone.

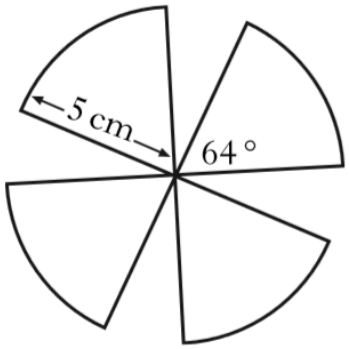
8 Two fridge magnets are mathematically similar.
One magnet is 4 centimetres long and the other is 10 centimetres long.



The area of the smaller magnet is 18 square centimetres.
Calculate the area of the larger magnet.

A fan has four identical plastic blades.

9



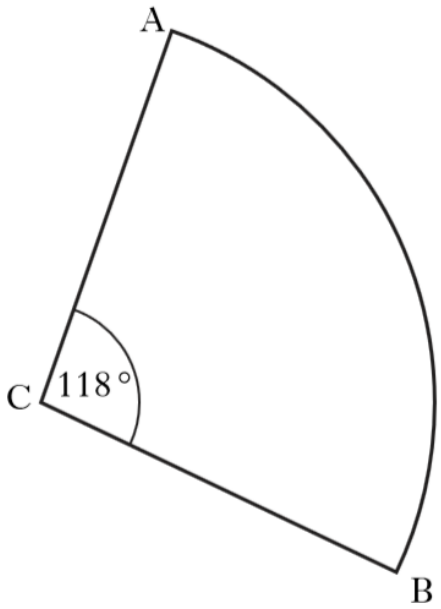
Each blade is a sector of a circle of radius 5 centimetres.

The angle at the centre of each sector is 64°.

Calculate the **total** area of plastic required to make the blades.

The diagram below shows a sector of a circle, centre C.

10

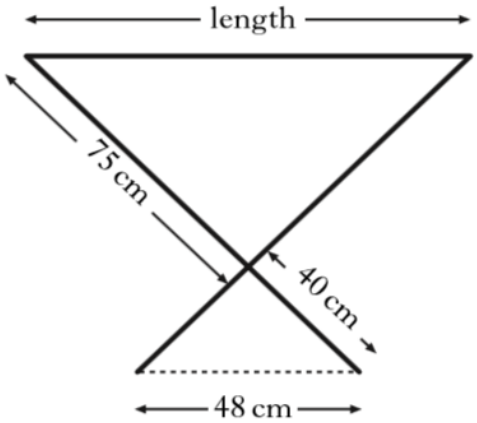


The radius of the circle is 10·5 centimetres and angle ACB is 118°.

Calculate the length of arc AB.

11 Mick needs an ironing board.

He sees one in a catalogue with measurements as shown in the diagram below.



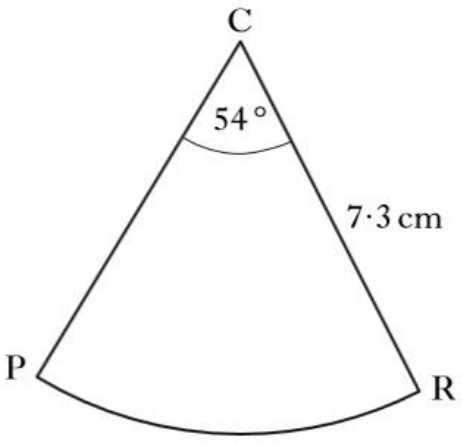
When the ironing board is set up, two similar triangles are formed.

Mick wants an ironing board which is at least 80 centimetres in length.

Does this ironing board meet Mick's requirements?

Show all your working.

12 The diagram below shows a sector of a circle, centre C.

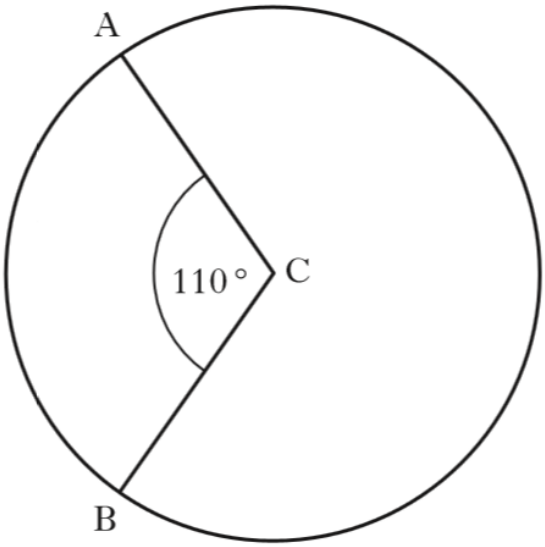


The radius of the circle is 7·3 centimetres and angle PCR is 54°.

Calculate the area of the sector PCR.

The diagram below shows a circle, centre C.

13

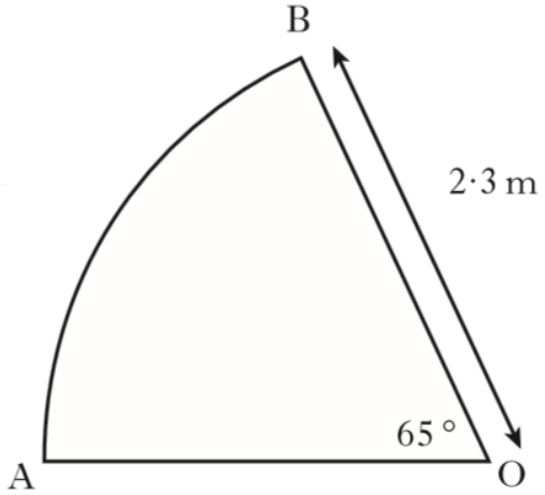


The circumference of the circle is 40·8 centimetres.

Calculate the length of the minor arc AB.

A sector of a circle, centre O, is shown below.

14



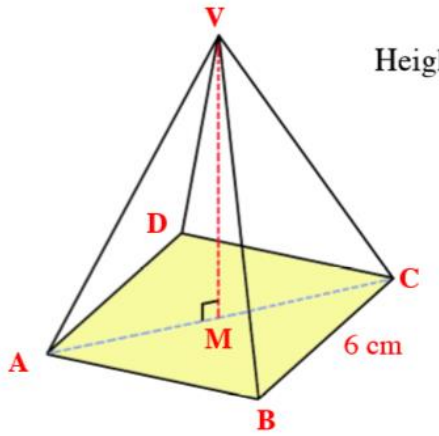
The radius of the circle is 2·3 metres.

Angle AOB is 65°.

Find the length of the arc AB.

15

Shown is a square based pyramid **ABCDV**.



Height **MV** = 9 cm.

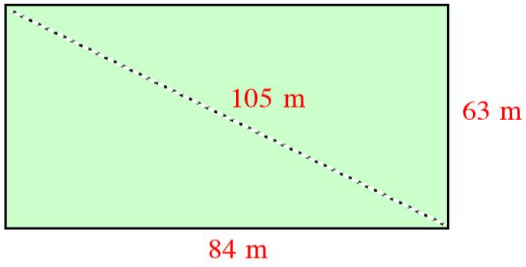
(a) Calculate the length of the diagonal **AC**.

(b) Write down the length of **AM**.

(c) Calculate the length of the sloping edge **AV**.

16

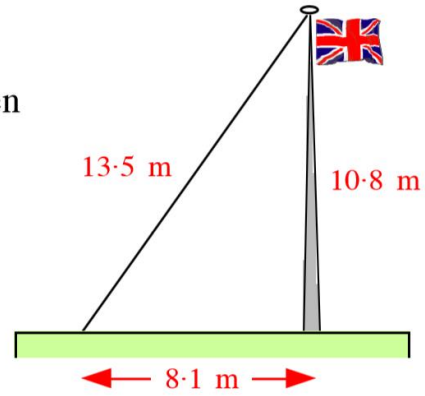
A groundsman wishes to make sure the football pitch is "**rectangular**".



To check, he measures the diagonal length.
Is the pitch rectangular ?

17

Has this flagpole been erected correctly, so that it is vertical ?



Now Revise

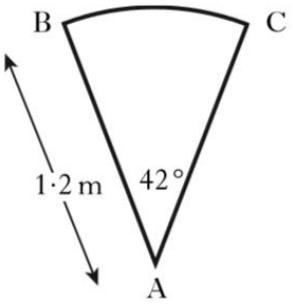
Unseen and Non Routine

Shape

Relationships 1.4

18

A spiral staircase is being designed.



Each step is made from a sector of a circle as shown.

The radius is 1·2 metres.

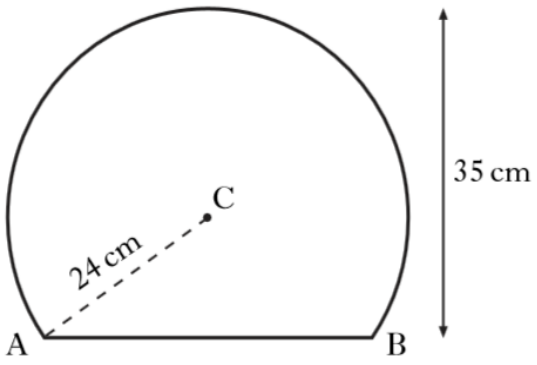
Angle BAC is 42°.

For the staircase to pass safety regulations, the arc BC must be at least 0·9 metres.

Will the staircase pass safety regulations?

19

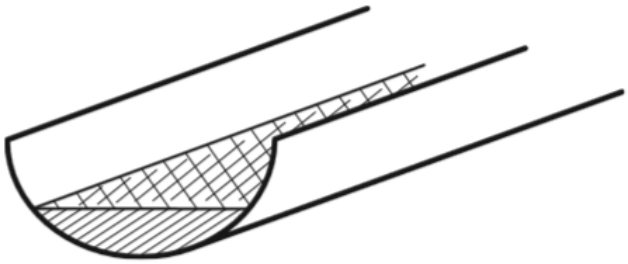
A mirror is shaped like part of a circle.



The radius of the circle, centre C, is 24 centimetres.
The height of the mirror is 35 centimetres.

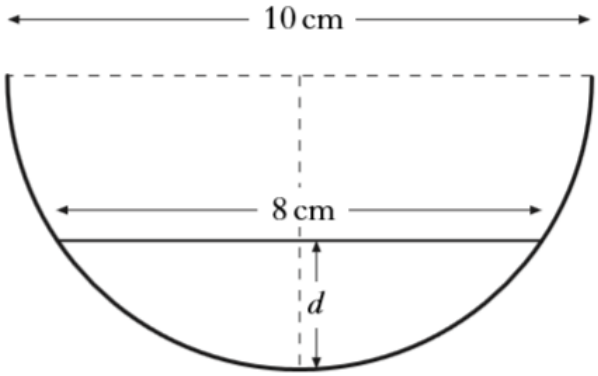
Calculate the length of the base of the mirror, represented in the diagram by AB.

20 The diagram shows water lying in a length of roof guttering.



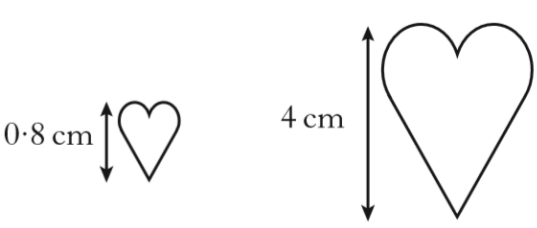
The cross-section of the guttering is a semi-circle with diameter 10 centimetres.

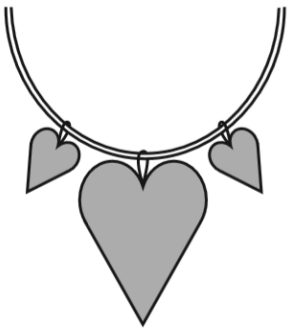
The water surface is 8 centimetres wide.



Calculate the depth, d, of water in the guttering.

21 A necklace is made of beads which are mathematically similar.





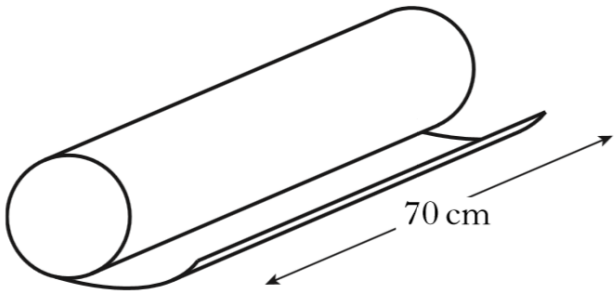
The height of the smaller bead is 0·8 centimetres and its area is 0·6 square centimetres.

The height of the larger bead is 4 centimetres.

Find the area of the larger bead.

Paper is wrapped round a cardboard cylinder **exactly** 3 times.
The cylinder is 70 centimetres long.

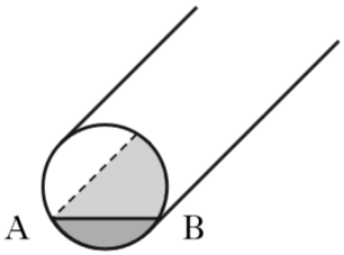
22

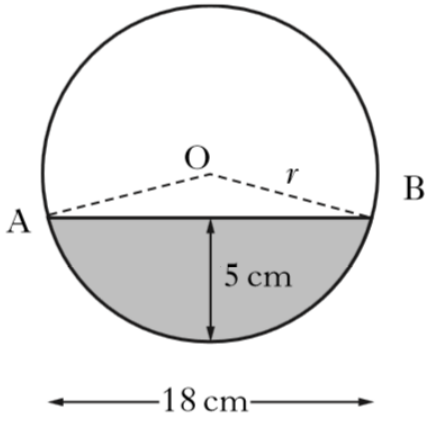


The area of the paper is 3000 square centimetres.
Calculate the diameter of the cylinder.

A pipe has water in it as shown.

23

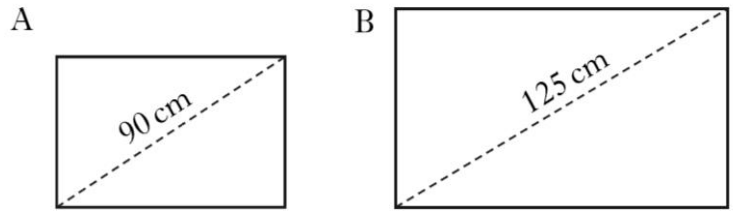




The depth of the water is 5 centimetres.
The width of the water surface, AB, is 18 centimetres.
Calculate r, the radius of the pipe.

24 Two rectangular solar panels, A and B, are mathematically similar.

Panel A has a diagonal of 90 centimetres and an area of 4020 square centimetres.



A salesman claims that panel B, with a diagonal of 125 centimetres, will be double the area of panel A.

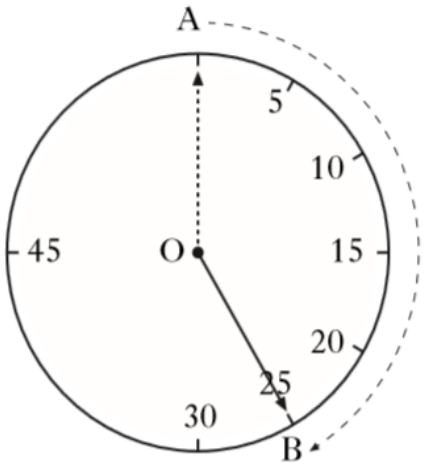
Is this claim justified?

Show all your working.

25 Contestants in a quiz have 25 seconds to answer a question.

This time is indicated on the clock.

The tip of the clock hand moves through the arc AB as shown.



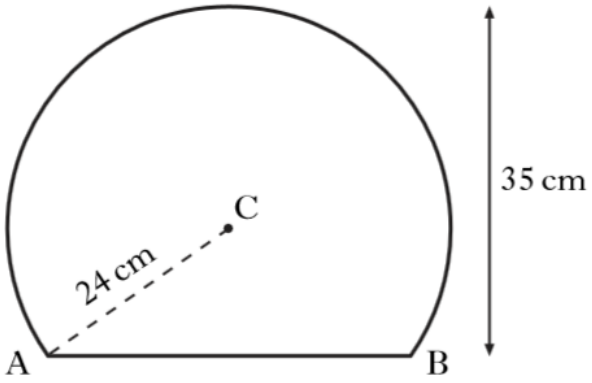
(*a*) Calculate the size of angle AOB.

(*b*) The length of arc AB is 120 centimetres.

Calculate the length of the clock hand.

A mirror is shaped like part of a circle.

26

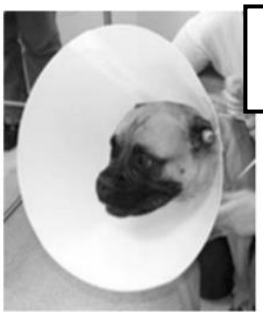


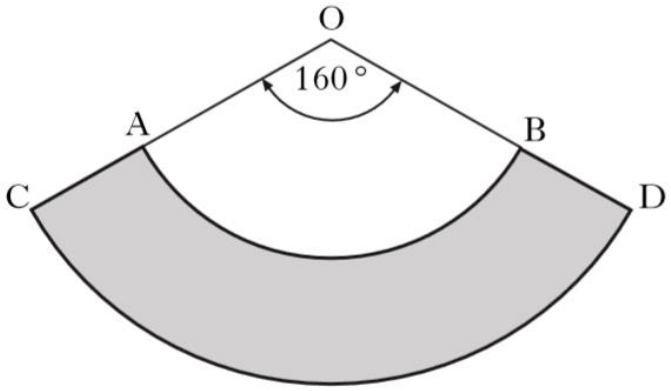
The radius of the circle, centre C, is 24 centimetres.
The height of the mirror is 35 centimetres.

Calculate the length of the base of the mirror, represented in the diagram by AB.

A pet shop manufactures protective dog collars.
In the diagram below the shaded area represents one of these collars.

27

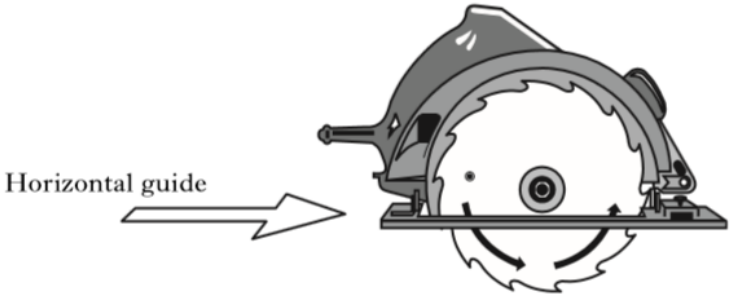




AB and CD are arcs of the circles with centres at O.
The radius, OA, is 10 inches and the radius, OC, is 18 inches.
Angle AOB is 160 °.

Calculate the area of a collar.

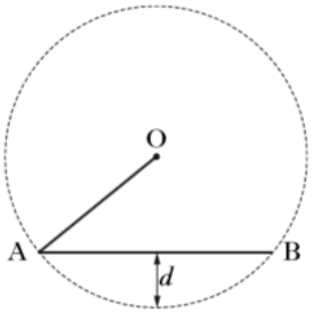
28 A circular saw can be adjusted to change the depth of blade that is exposed below the horizontal guide.



The circle, centre O, below represents the blade and the line AB represents part of the horizontal guide.

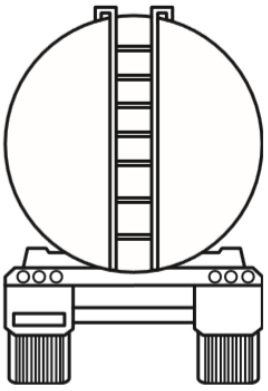
This blade has a radius of 110 millimetres.

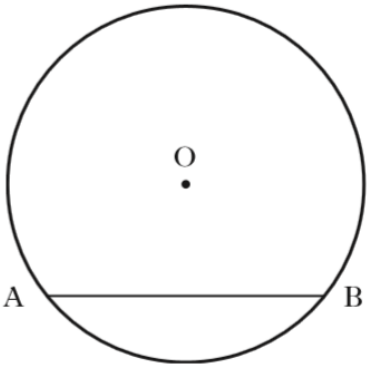
If AB has length 140 millimetres, calculate the depth, d millimetres, of saw exposed.

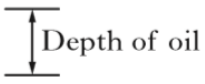


29 A tanker delivers oil to garages.

The tank has a circular cross-section as shown in the diagram below.







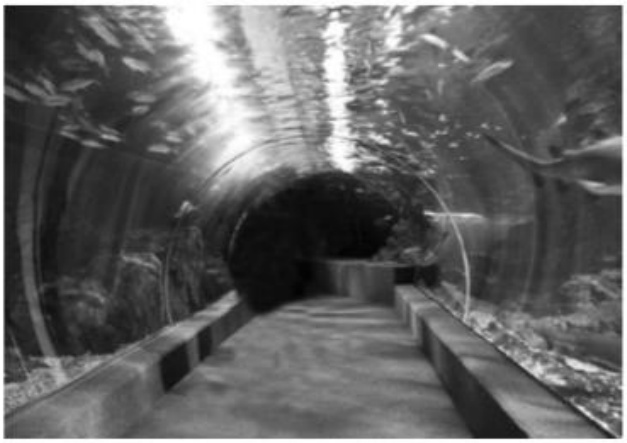
The radius of the circle, centre O, is 1·9 metres.

The width of the surface of the oil, represented by AB in the diagram, is 2·2 metres.

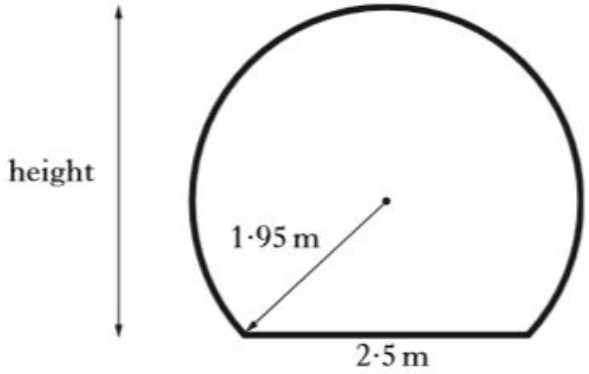
Calculate the depth of the oil in the tanker.

Ocean World has an underwater viewing tunnel.

30



The diagram below shows the cross-section of the tunnel. It consists of part of a circle with a horizontal base.



The radius of the circle is 1·95 metres and the width of the base is 2·5 metres.

Calculate the height of the tunnel.

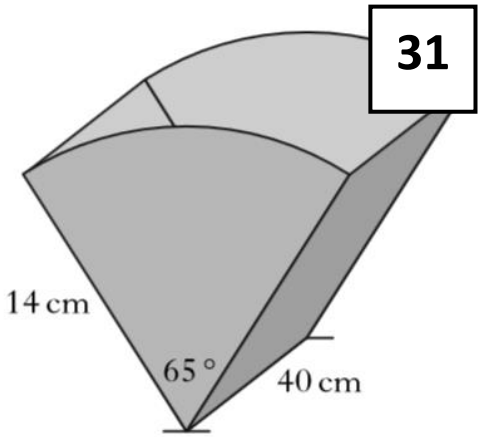
31

The ends of a magazine rack are identical.

Each end is a sector of a circle with radius 14 centimetres.
The angle in each sector is 65 °.

The sectors are joined by two rectangles, each with length 40 centimetres.

The exterior is covered by material.
What area of material is required?



32

Shown is a square based pyramid and a cone.

By calculating the height of both, decide which has the greater **volume** and by how much.